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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/685,550	10/14/2003	Wayne G. Renken	SENS.005US1	4924

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EXAMINER	
GARBER, CHARLES D	
ART UNIT	**PAPER NUMBER**
2856	

DATE MAILED: 03/16/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/685,550	RENKEN, WAYNE G.	
	Examiner	Art Unit	
	Charles D. Garber	2856	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 July 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *21-25,27-36 and 45-54* is/are pending in the application.

4a) Of the above claim(s) *47-54* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *21-25,27-36,45 and 46* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *7/26/04,6/30/04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Response to Arguments

Applicant's arguments filed 07/15/2005 have been fully considered but they are not persuasive.

Applicant argues the thermometer 16 of Akram is not disclosed as being inside a process environment or rotating environment.

Examiner notes that Akram says nothing about where the thermometer 16 is placed. It may be inside.

Applicant argues the thermometer has no protective structure to allow it to operate within a process environment.

Examiner notes that neither does the Applicant's invention.

Applicant argues Lauf reaches signal transmission structure is on the substrate and replacing the external circuitry 12 with the transmitter would not provide the connecting lead.

Examiner does not consider Lauf teaches replacing external circuitry 12. Examainer considers thermometer 16, which collects the temperature data, also communicates with the process control but Akram is silent as to how it communicates. Examiner considered Lauf taught the data (collected by the thermometer 16 through cable 14) would be communicated using RF taught by Lauf, which would leave the cable in place. The RF device would go with thermometer 16, not on substrate 22. Lauf does indeed teach away from wires running from the sensors to points outside the processing environment, but neither does Akram. Akram says nothing about how data

collected by thermometer 16 is communicated to the outside process control. It could be by wire or wireless. Akram leaves it open to whatever technology might be available.

Applicant argues the perimeter of the module encloses area the same or less than the perimeter of the substrate.

Examiner considers the Akram figures are generally illustrative of the general configuration of the structure including the rectangular structure of the thermometer data acquisition device.

Applicant argues the calibration procedure taught by Schwartz with respect to claim 29 and 34 has no particular location as in the instant invention which is remote.

Please see new grounds of rejection below.

Applicant's arguments with respect to claim 30 and 31 are substantially and the Larson reference are substantively the same as those regarding the Lauf reference. Examiner's remarks above apply.

Applicant argues with respect to claim 32 that there is insufficient motive to combine Smesny's teaching mechanical , optical or acoustic connection to external output device. Examiner considers the problem Akram presents is that there is a clearly implied communication between the thermometer 16 and the processing device temperature control system but no specific means to achieve it. Smesny teaches three ways to achieve this communication are my mechanical, optical and acoustic connection. It would have been obvious to one having ordinary skill in the art at the time the invention was made to achieve Akram's communication to the processing control by any one of mechanical, optical or acoustic connections.

Election/Restrictions

Newly submitted claims 47-54 are directed to an invention that is independent or distinct from the invention originally claimed for the following reasons:

I. Claim21-25, 27-36, 45 and 46, drawn to substrate with sensors, electronics module with signal acquisition, data transmission and power, flexible leads connecting substrate and module, remote data processing system, classified in class 73, subclass 866.1.

II. Claims 47-51, drawn to instrumented substrate, data processing system, electronics module that moves independent of substrate, physically continuous flexible connection between module and substrate, classified in class 438, subclass 18.

III. Claims 52-54, drawn to method of sensing and analyzing process conditions in a substrate process environment including generating sensor signals, sending signal data to electronics module sending sensor signal data from module to a data processing system, moving module separately from data processing system, classified in class 438, subclass 18.

Inventions I and II are related as combination and subcombination. Inventions in this relationship are distinct if it can be shown that (1) the combination as claimed does not require the particulars of the subcombination as claimed for patentability, and (2) that the subcombination has utility by itself or in other combinations (MPEP § 806.05(c)). In the instant case, the combination as claimed does not require the particulars of the subcombination as claimed because the combination does not require

independent movement between substrate and module. The subcombination has separate utility such as selectively placing module inside and outside process environment.

Inventions I and III are related as product and process of use. The inventions can be shown to be distinct if either or both of the following can be shown: (1) the process for using the product as claimed can be practiced with another materially different product or (2) the product as claimed can be used in a materially different process of using that product. See MPEP § 806.05(h). In the instant case the product does not require separate movement between the substrate and module, only the ability to do so.

Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claims 47-54 are withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 21, 35, 45, 46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Akram et al. (US Patent 6,472,242) in view of Lauf et al. (US Patent 5,969,639).

Regarding claim 21, Akram discloses methods of semiconductor processing including a substrate 11 shown in figure 1 having a first perimeter, the substrate comprising sensors 30 to measure the processing conditions of the substrate at different areas of the substrate also as shown.

External circuitry 12 may be considered to be an electronics module having a second perimeter as shown at 16. The perimeter of the thermometer shown in figure 1A appears smaller than the perimeter of the substrate 22 as in the instant invention. The circuitry is shown connected to the sensors and the circuitry has a data gathering function (column 3 lines 46-55) which is considered equivalent to signal acquisition circuitry coupled to an output of the sensors. "External circuitry 12 includes communication devices in other embodiments of the invention to transmit process conditions" which is considered equivalent to data transmission circuitry coupled to the signal acquisition circuitry as in the instant invention. Figure 1 also shows leads

connecting the substrate to the circuitry for transmitting signals between the substrate and the circuitry.

Akram does not expressly recite the circuitry including a power source. However, Examiner considers that a source at least of electrical power must be inherent in order to for the electrical device to carry out the functions attributed to it. Whether it is a battery, a power cord connecting to it, or receiver receiving beamed power the perimeter of circuitry 12 will extend to include at least a part of it.

The cable 14 is not expressly flexible.

However, Examiner considers that any physical material that might be used in the fabrication of the cable 14 has some degree of flexibility (predictable by the elastic modulus that is a characteristic of all real materials) and movement between the substrate 22 and thermometer 16 will necessarily occur (even if only very slight) if force is applied to the cable 14.

Akram discloses processing the data to "facilitate substrate temperature control" (column 1 lines 29-35) but Akrams communication between the circuitry 12 and such process control is not expressly "wireless" as in the instant invention.

Lauf discloses a similar system with temperature sensor 720 and signal acquisition or conditioning circuit 730. Lauf teaches connecting an RF transmitter 750 and antennae 770 in order to transmit the sensor data to a remote location 850 (see figures 7, 8, abstract, column 1 lines 45-51 and column 3 lines 46-61).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the data transmission circuitry with an RF

antennae in order to eliminate hard wire connection outside the process environment which interferes with probe placement or rotating environment.

As for claim 35, Akram discloses the alternative of sensing temperature.

As for claim 45, figure 1 shows the circuitry 12 is below the substrate and displaced from the substrate such that the first and second perimeter do not intersect.

As for new claim 46, It has been held that a recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus satisfying the claimed structural limitations *Ex parte Masham* 2 USPQ2d 1647 1987). In this case the robot hands do not comprise a functional part of the invention and the use of robot hands is considered intended use.

Claims 22, 24, 25, 27, 28, 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Akram et al. (US Patent 6,472,242) as modified by Lauf et al. (US Patent 5,969,639) and applied to claim 21 above and further in view of Smesny et al. (US Patent 5,444,637).

Regarding claim 22, the references as applied above do not expressly teach the signal acquisition circuitry is configured to amplify an output signal of the sensors.

Smesny teaches either a "Bridge amplifiers" or an "inverting amplifier arrangement" is "well suited for producing an output voltage proportional to a resistance value of the sensor (i.e., thermistor or magneto-resistive material)." (column 9 lines 6-13)

It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide an amplifier for the resistance temperature sensors of

Akram as they are well suited for producing an output voltage proportional to the sensor resistance.

As for claims 24 and 25, the resistance type temperature sensors of Akram inherently require a power signal in order to function as disclosed.

As for claims 27 and 28, Smesny further teaches The device also includes "signal acquisition/conditioning circuit which receives analog signals from each of the sensors placed upon the wafer and converts the analog signals to corresponding digital signals. Digital signals can then be stored"

It would have been obvious to one having ordinary skill in the art at the time the invention was made to convert analogue signal to digital so that the temperature values may be stored in memory and used to control the processing system.

As for claim 33, Akram does not expressly recite the circuitry 12 comprises one or more connectors to couple a remote system to the device with a communications cable. Smesny however further teaches probe pad 26 which provides mechanical, optical or acoustic access to an external output device.

It would have been obvious to one having ordinary skill in the art at the time the invention was made provide a mechanical access or connector for external output of the processed sensor data in order to provide data on the processing conditions in order to control the processing machinery and optimize the processing conditions (column 1 lines 40-52).

Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Akram et al. (US Patent 6,472,242) Akram et al. (US Patent 6,472,242) as modified by Lauf et

al. (US Patent 5,969,639) and applied to claim 21 above and further in view of Schwartz et al. (US Patent 5,669,713).

The references as applied above do not expressly teach the data transmission circuitry comprises a microcontroller and is configured to correct the output signal using sensor calibration coefficients.

Schwartz teaches resistance or thermocouple type temperature sensors are calibrated with a calibration device in order to derived calibration value R_{PRTCAL} in a microprocessor 22 used in a process control system (abstract, column 1 lines 13-34, figure 5 and column 7 line 30 to column 8 line 5)

It would have been obvious to one having ordinary skill in the art at the time the invention was made to calibrate a resistance type temperature sensor with calibrations values in a microprocessor. This provides a small device and rapid means or correcting temperature values against an accurate standard.

Claims 29, 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Akram et al. (US Patent 6,472,242) as modified by Lauf et al. (US Patent 5,969,639) and applied to claim 21 and further in view of Schwartz et al. (US Patent 5,669,713).

Regarding claim 29, the references as applied above do not expressly teach the system comprises configuration to correct the output signal using sensor calibration coefficients at the remote processing system.

Schwartz teaches resistance or thermocouple type temperature sensors are calibrated with a calibration device in order to derived calibration value R_{PRTCAL} in a

microprocessor 22 used in a process control system (abstract, column 1 lines 13-34, figure 5 and column 7 line 30 to column 8 line 5)

It would have been obvious to one having ordinary skill in the art at the time the invention was made to calibrate a resistance type temperature sensor with calibrations values. This provides means for correcting temperature values against an accurate standard.

While Schwartz teaches no particular location for where the calibration processing should occur Examiner considers it would have been obvious to one having ordinary skill in the art at the time the invention was made to process the calibration correction either on the thermometer 16 or remotely where Akram discloses the "methods that facilitate substrate temperature control", since it has been held that rearranging parts of an invention involved only routine skill in the art. *In re Japikse*, 86 USPQ 70 (CCPA 1950).

As for claim 34, as discussed above with respect to claim 23 Schwartz advantageously taught the system with microprocessor control.

Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over Akram et al. (US Patent 6,472,242) as modified by Lauf et al. (US Patent 5,969,639) and applied to claim 21 above and further in view of Larson, III et al. (US Patent 6,651,488).

The references as applied above do not expressly teach a transceiver transmits and receives RF signals.

Larson, III discloses a similar monitoring system teaching a transceiver system 28 for obtaining sensor data from substrate processing by interrogation (abstract and figure 1).

It would have been obvious to one having ordinary skill in the art at the time the invention was made monitor substrate processing with a transceiver connected to sensors so the data my be obtained by interrogation or on demand. This will have the advantage of saving power on the isolated substrate having limited supply of power by transmitting only intermittently when data are needed rather than continuously.

Claim 31 is rejected under 35 U.S.C. 103(a) as being unpatentable over Akram et al. (US Patent 6,472,242) as modified by Larson, III et al. (US Patent 6,651,488) and applied to claim 30 and further in view of Lauf et al. (US Patent 5,969,639).

The references as applied to claim 30 teach the in-process monitoring system with a transceiver transmitting and receiving in RF but not expressly in IR.

Lauf discloses a similar system with temperature sensor 720 and signal acquisition or conditioning circuit 730. Lauf also discloses connecting RF wireless communication inferface with the conditioning circuit to eliminate wiring. Lauf further explains RF must be interpreted broadly to include, microwave, optical (including infrared) (column 4 lines 18-28 and Example 3).

By Lauf's interpretation of what RF includes Larson, III may be considered to further teaches the use of IR in the broad context of RF which is advantageous for the same reasons given above.

Claim 32 is rejected under 35 U.S.C. 103(a) as being unpatentable over Akram et al. (US Patent 6,472,242) as modified by Larson, III et al. (US Patent 6,651,488) and applied above and further in view of Smesny et al. (US Patent 5,444,637).

Akram and Larson, III as discussed above with respect to claim 30 teach an in-process monitoring system with a transceiver transmitting and receiving but not expressly with sonic signals.

Smesny discloses a similar in-process monitoring system teaching an output pad 26 providing alternatively mechanical (contact type) as well as optical or acoustic (non-contact type) connection to external output device in order to communicate the real time processing conditions so they may be optimally controlled.

Akram clearly implies communication between the thermometer 16 and the processing device temperature control system but Akram provides no specific means to achieve it. While Larson suggests only RF means Smesny teaches three ways to achieve this communication are my mechanical, optical and acoustic connection. It would have been obvious to one having ordinary skill in the art at the time the invention was made to achieve Akram's communication to the processing control by any one of mechanical, optical or acoustic connections according to Smesny.

Claim 36 is rejected under 35 U.S.C. 103(a) as being unpatentable over Akram et al. (US Patent 6,472,242) as modified by Lauf et al. (US Patent 5,969,639) and applied to claim 21 above and further in view of Renken et al. (US Patent 6,190,040).

The references as applied above do not expressly teach the connection 14 is a ribbon cable.

Renken teaches ribbon cables 52, 62 in similar application.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to make connection with ribbon cable as they have many advantages including extremely small bending radius, high flexibility and minimum waste of space.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Charles D. Garber whose telephone number is (571) 272-2194. The examiner can normally be reached on 8:00 a.m. to 4:30 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hezron Williams can be reached on (571) 272-2208. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Charles D. Garber
Primary Examiner
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